Claims:

1. A method for increasing the interference resistance of a time domain reflectometer, in particular to high-frequency radiation, in which a transmission pulse (X_S) is generated at a pulse repetition frequency (f_{prf}) and coupled into a waveguide (4) whose upper end toward the process terminal is disposed on a holder part (18), and the signal (X_{probe}), reflected back by a reflector (14) which is in contact with the waveguide (4) and returning on the waveguide (4), is scanned for time-expanded display as a reflection profile with scanning pulses (X_A), which are repeated at a scanning frequency (f_A), and from the reflection profiles, measured values are continuously obtained that contain the distance of the reflector (14) to the process terminal, having the following characteristics:

I) the scanning frequency (f_A) and the pulse repetition frequency (f_{prf}) are varied, and either

II.1) the time-expanded display of the reflection profile remains unchanged, or

II.2) if the reflection profile changes over time, the change in the time expansion is known and is taken into account in the evaluation of the profile;

III) an amount of interference is determined from at least one measurement of the reflection profile or a part thereof;

IV) for deciding about the usability of the measured

values, an algorithm is used which from the measured values and the amount of interference calculates whether the reflection profile is sufficiently free of interference that adequate measurement accuracy is achieved.

2. The method of claim 1, characterized in that the algorithm comprises the following steps:

V) if the amount of interference exceeds a predetermined threshold, the scanning frequency (f_A) and the pulse repetition frequency (f_{prf}) are varied;

VI) the amount of interference is determined and assessed again;

VII) steps V) and VI) are repeated until the amount of interference is below the predetermined threshold.

3. The method of claim 2, characterized in that the variation in the scanning frequency (f_A) and the pulse repetition frequency (f_{prf}) is made on the basis of a predetermined table which contains suitable frequencies, the access to the table to being linear or random.

4. The method of claim 3, characterized in that for changing the scanning frequency (f_A) and the pulse repetition frequency (f_{prf}), the frequencies are selected from a frequency range.

5. The method of one of the foregoing claims, characterized in that the pulse repetition frequency (f_{prf}) is varied by means of a voltage controlled or numerically controlled oscillator (VCO or NCO).

6. The method of claim 5, characterized in that the scanning trigger signal (X_{TA}) is obtained from the transmission trigger signal (X_{TS}) by means of a controllable delay circuit (11), and the delay circuit (11) is supplied with a reference signal (X_S) or (X_{TS}) at the pulse repetition frequency (f_{prf}), and the delay circuit (11) generates an output signal (X_A and X_{TA}), and the delay in the output signal (X_A, X_{TA}) is determined by a predeterminable set-point delay value, with which the delay circuit (11) is controlled.

7. The method of one of the foregoing claims, characterized in that the amount of interference is obtained by a comparison of the pulse, created by the reflection at the boundary layer, with a predetermined reference pulse.

8. The method of one of the foregoing claims, characterized in that the amount of interference is obtained by means of the difference between the maximum and minimum deviation in the reflection profile from a predetermined value or from the reference profile in a predetermined time slot or spacing slot.

9. The method of one of claims 1 or 2, characterized in that the frequency and/or phase of the scanning pulses (X_A) upon a variation in the pulse repetition frequency (f_{prf}) is adapted such that the difference between the scanning frequency and the pulse repetition frequency does not exceed a predetermined range or is constant.

10. A method for increasing the interference resistance of a time domain reflectometer, in particular to high-frequency radiation, in which at a pulse repetition frequency (f_{prf}) a transmission pulse (X_S) is generated and

coupled into a waveguide (4), whose upper end toward the process terminal is disposed on a holder part (18), and the signal (X_{probe}), reflected back by a reflector (14), which is in contact with the waveguide (4), and returning on the waveguide (4) is scanned for time-expanded display as a reflection profile with scanning pulses (X_A), which are repeated at a scanning frequency (f_A), and from the reflection profiles, measured values are continuously obtained that contain the distance of the reflector (14) to the process terminal, having the following algorithm for deciding on the usability of the measured values;

I) varying the scanning frequency (f_A) and the pulse repetition frequency (f_{prf}), and either

II.1) the time-expanded display of the reflection profile remains unchanged, or

II.2) if there is a change over time in the reflection profile, the change in the time expansion is known and is taken into account in the evaluation of the profile;

III) determining the amount of interference and obtaining the measured value from the measurement of the reflection profile or of a part thereof;

IV) checking the usability of the measured value by evaluating the amount of interference, and continuing with step I.

11. The method of claim 10, characterized in that the algorithm has the following further steps:

V) steps I-IV are executed multiple times, for example five times;

VI) selecting the most likely measured value from the measured values determined in step V), and using that value.

12. A circuit arrangement for performing the method of either claim 1 or claim 10, characterized in that

the circuit arrangement has a trigger generator (1), which generates a transmission trigger signal (X_{TS}) with a variable pulse repetition frequency (f_{prf}) that is variable by a control signal, and a scanning trigger signal (X_{TA}) with a frequency and/or phase different from the transmission trigger signal (X_{TS}), and the transmitting and scanning trigger signal cause a transmitting or scanning generator (2, 5) to generate transmitting and scanning pulses, respectively, and having a scanning unit (6, 7), which is capable of scanning the transmission pulses (X_{probe}) returned from the waveguide (14) for time-expanded display as a reflection profile (X_{video}), and having a control unit (8), which is capable of evaluating the reflection profile and generates control signals which adjust the phase or frequency difference between the trigger signals, and with which the trigger generator (1) is made to vary the pulse repetition frequency (f_{prf}).

13. The circuit arrangement of claim 12, characterized in that the trigger generator (1) includes a controlled oscillator (10), which for example is voltage controlled or numerically controlled (VCO or NCO), which oscillates at the pulse repetition frequency (f_{prf}).

14. The circuit arrangement of claim 12 or 13, characterized in that the trigger generator (1) includes a controllable delay circuit (11), which is subjected to the output signal of the controlled oscillator (10), and whose output signal represents the scanning trigger signal (X_{TA}).

Sub A4

15. The circuit arrangement of claim 13 or 14, characterized in that the trigger generator (1) includes not only the controlled oscillator (10, CO), which oscillates at the pulse repetition frequency (f_{prf}), but also a further controlled oscillator (CO), which oscillates at the scanning frequency (f_A), and optionally the difference in frequencies is set to a predetermined value with a regulator and kept constant.

16. The circuit arrangement of claim 15, characterized in that the oscillators are embodied as an oscillator bank, in order to furnish a constant frequency difference between the pulse repetition frequency (f_{prf}) and the scanning frequency (f_A).